

### SYLLABUS FOR GENERAL CHEMISTRY 130

Lecture: 3 credit hours

Laboratory: 1 credit hour (See page 4)

**Instructors:**

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#### Mission Statement

Southern University at Shreveport (SUSLA), an autonomous unit of the Southern University System A & M System, seeks to provide a quality education for its students, while being committed to the total community. This institution awards certificates and associates degrees, prepares students for careers in technical and occupational fields, and offers courses and programs that are transferable to other colleges and universities. Dedicated to excellence in instruction and community service, this open enrollment institution promotes cultural diversity, provides developmental and continuing education, and seeks partnerships with business and industry. The University intends that all individuals should have an opportunity to receive educational experiences and related services, which are compatible with their varied interests, academic abilities, achievements, family backgrounds, motivations, needs and goals.

#### Text Book:

Introductory Chemistry: A Foundation by Zumdahl.

#### Course Description and Introduction

Designed to meet the needs of students who have had little or no previous chemistry courses, this course emphasizes the basic principles of chemistry and their applications to man and his environment.

Chemistry 130 considers introductory topics in the field of general chemistry. It is designed for students with little or no previous background in chemistry, but who need an understanding of the basic problems of chemistry to pursue their career goal and interests. Students who have previous chemistry knowledge and want to learn the skills needed to advance their studies for particular interests and careers. In this course, the development of chemical topics always starts at ground level. Clearly some chemical principles cannot be divorced entirely from mathematics; therefore knowledge of basic mathematical principles is essential if you are to be successful in solving chemical problems. The course starts and focuses on fundamental chemical principles and later builds on the foundations of these principles; develop the concepts and applications central to the field of the introductory chemistry course.

During this course of chemistry the students will examine different aspects of the chemistry -starting with chemistry, measurements and metric units, matter and energy all the way to atoms, molecules and ions, electron structure of the atom, chemical formulas, names and chemical bonds as well as chemical reactions, composition and calculation quantities of the reactants and products of the reactions.

At the end of the semester you should be able to demonstrate significant knowledge about the structure and changes in matter as well as the fundamental importance of chemistry in today's world.

### **OBJECTIVES**

For a passing grade in this course, a student should be able to demonstrate the following objectives with 70% proficiency on problem sets and examinations:

#### **Introduction to Chemistry**

1. Be able to understand and use the fundamental terminology (matter, elements, compounds, chemistry,
2. law, hypothesis, theory, and scientific method)
3. Be able to define chemistry and state the major concerns of this science. .
4. Describe the view of matter held by the ancient Greeks.
5. Describe the principal goal of the alchemists and their contribution to chemistry.
6. Describe Lavoisier's and Priestley's experiments.
7. Differentiate between the terms experiment, law, hypothesis, and theory.
8. Describe what is meant by the scientific methods.

#### **Measurement in Chemistry**

1. Convert numbers in decimal form to scientific notation, and vice versa.
2. Describe the role of base units and prefixes in the metric system.
3. State the SI base units used to measure length, mass and time and define the common SI prefixes.
4. Explain the difference between mass and weight and between temperature and heat.
5. Be able to write conversion factors between two units.
6. Be able to do single-step and multi-step conversions problems, using dimensional analysis.
7. Convert temperatures between Celsius, Fahrenheit and Kelvin scales.
8. Define density and be able to calculate one of the quantities--given the other two.

#### **Stoichiometry Relationships**

1. Define stoichiometric quantities.
2. Given a balanced equation and the quantity of each reactant, identify the limiting reagent; then
3. Calculate the quantity of product formed and the amount of any reactants left over.
4. Given the mass of a limiting reagent and the mass of product recovered, calculate the percentage Yield.

#### **Electron Structure of Atoms**

1. Describe the characteristic properties of electromagnetic radiation.
2. Describe the difference between the line spectrum of an element and the continuous spectrum obtained from white light.
3. Describe the two concepts of Bohr's atomic theory that are retained in quantum mechanics.
4. Define the terms orbital, electron shell, subshell, quantum number and electron configuration.
5. Calculate the number of orbitals in a given shell from the shell quantum number  $n$ .
6. Describe the Pauli exclusion principle.
7. Be able to write the electron configuration of any element, knowing the order of filling.
8. Demonstrate the similarity of the outer shell electron configurations of the elements in any group of the periodic table. ,
10. Define the term valence electrons.

### Periodic Properties of the Elements

1. State the two trends shown by the metallic-nonmetallic character of the element in the periodic table
2. Describe the characteristic chemical properties of the main groups of elements.
3. Use the trends shown by the atomic radii of main-group elements to predict relative sizes of two atoms or two ions.
5. Define the term ionization energy.
6. Explain how periodic trends in the ionization energy of atoms relate to trends in their metallic character. :

### Chemical Bonding

1. Define the terms ionic bond, the octet rule, electron-dot symbol, covalent bond, polar covalent bond, and bond length.
2. Write electron-dot symbols for common atoms and ions.
3. Describe the formation of a covalent bond between two non-metallic atoms.
4. Given the molecular formula of a small molecule, draw the molecule's electron dot structure.
5. Describe the valence shell electron-pair concept model for predicting molecular shape.
6. Explain linear, trigonal planar and tetrahedral arrangements and give one example of each.

### Southern University's General Education

#### Student Learning Outcomes:

1. Demonstrate proficiency in written and oral communication
2. Solve problems by interpreting, analyzing, evaluating and applying known information received from statistical and other data sources.
3. Effective utilization of technology for the production of documents for presentations, etc.
4. Demonstrate professional and ethical behavior as required by discipline-specific codes of conduct and as needed in a diverse and global workforce or in the articulation to a institution of higher learning.

### Evaluation

#### 1. Grades

The following scale will be used in assigning grades.

- A- 90-100%,
- B -80 -89%
- C-70 -79%
- D-60-69%
- F -below 59%

#### 2. Methods of evaluation

- A- Quizzes
- B -Homework Problems
- C -Exams (
- E -Final Examination -(comprehensive)
- F -Research Project

**Laboratory Section: 1 Credit Hour (Separate course than lecture)**

**Schedule for Laboratory Experiments:**

- 1. Basic Laboratory Techniques**
- 2. Identification of a Substance by Physical Properties**
- 3. Separation of the Components of a Mixture**
- 4. Chemical Reactions**
- 5. Chemical Formulas**
- 6. Chemical reactions of Cooper and Percent Yield**
- 7. Paper Chromatography**
- 8. Behavior of Gases: Molar Mass**
- 9. Determination of R: The gas Law Constant**

**Conference Hours**

Conference hours for each instructor have been arranged according to teaching schedule. If a student cannot meet with said instructor during scheduled conference periods, the student should arrange a time with the instructor that is convenient for both. A schedule for conference periods is posted on the office door of each instructor.

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**Disability Act**

All students with disabilities must notify the instructor for any needed assistance in compliance with the American Disability Act (ADA). In compliance with ADA policies, all qualified students enrolled in the course are entitled to "reasonable accommodations".

**Cell Phones:**

Cell phone usage is prohibited in the classroom. If you bring your cell phone to class, it must be turned **OFF**. This class will **not** be disturbed by the ringing of your phone. **No excuses.**

**Attendance Requirements and Methods of Instruction:**

You must attend all lectures and laboratories as this will enhance the learning process. Attendance is particularly important for laboratory periods as this forms the practical (hands-on) basis of learning chemistry. Absences will be excused for tests **only** in the case of documented illness (the instructor reserves the right to demand proof of illness, i.e., a note from your doctor), family emergencies, or activities approved in advance with the instructor. Other reasons may be considered upon request. **It is your responsibility** to inform and make arrangements with the instructor if you are absent otherwise the absence will be unexcused. Unannounced quizzes (pop quizzes) will be given periodically, usually at the beginning of class. The quizzes will cover the material discussed in the previous lecture and the reading assignment for that day. No make-up pop quizzes will be given. In individual cases, it is inevitable that absences will occur. Each

student is allowed three absences without penalty. If a student has accumulated more than three absences due to illness or extreme circumstance he should secure a legitimate excuse. **Class cutting does not constitute a valid excuse.** In all cases the student is still held responsible for all work missed during the period of absence. If an examination has been given it is the responsibility of the student to arrange with the instructor for a make-up exam **immediately** upon returning to class.

Lectures will cover material in the text as indicated in the syllabus or assigned by the instructor (the instructor reserves the right to modify this at any time), and therefore the appropriate material from the text should be studied **before coming to class**. Typically, any given lecture will cover the sections of the text following the sections discussed in the previous lecture; this reading assignment is assumed (in other words: **read ahead**).

Assigned readings and lecture material will be the subject of quizzes. Class periods will consist of lecture, discussion, problem solving, demonstrations, and other methods suitable to the material.

### **Conduct**

You are expected to be full participants in Chemistry 130. We are dedicated to doing everything that is reasonable to help you learn the material. We present lectures and sections on time and within the appointed time slots, and we request that you show respect for your classmates and instructor by showing up to class on time and prepared.

Please feel free to ask questions about concepts that you do not understand. However, talking during lecture or discussion or in any way causing unnecessary disruptions will not be tolerated. Please turn off cell phones and stay in your seat during lecture or discussion unless it is absolutely necessary to leave. Following these simple requests will enable all of us to focus on the endeavor that brought us together: learning chemistry.

### **Materials and Supplies**

Students are asked to obtain a large spiral notebook to be used exclusively for chemistry notes, assignments, and problems. In this way all accumulated lecture notes, definitions, examples, and problems will be together which proves very helpful when studying for exams and quizzes. An extremely important aid for solving problems is a calculator. If you do not have one, buy one immediately and learn to use it. Start using the calculator with the first assignment, where the arithmetic is simple. See if you can get the same answers for the worked-out examples given in the text. Then use the calculator to work problems assigned at the end of the chapter.